2-3 Factoring Polynomials

(Book 6.4 pg. 353-)

Objectives:

- I can factor a polynomial by GCF, special factoring, and factor by grouping
- I can find multiple representations of factored polynomials

Factor the following:

$1x^2 - 7x + 10$

$(x^2 - 2x)(-5x + 10)$

$x(x-2) - 5(x-2)$

$(x-5)(x-2)$

- 2 #'s multiply to be c
- 2 #'s add to be b

$x^2 + x - 30$

$(x^2 - 5x)(6x - 30)$ -30

$10 \mid 3$

$-5 \mid 6$

$15 \mid 2$

$30 \mid 1$

$x(x-5) + 6(x-5)$

$(x+6)(x-5)$

$2x^2 - 3x - 2$

10

$-5 \mid 2$

$6x^2 - 7x - 5$

-30

$6 \mid 5$

$-10 \mid 3$

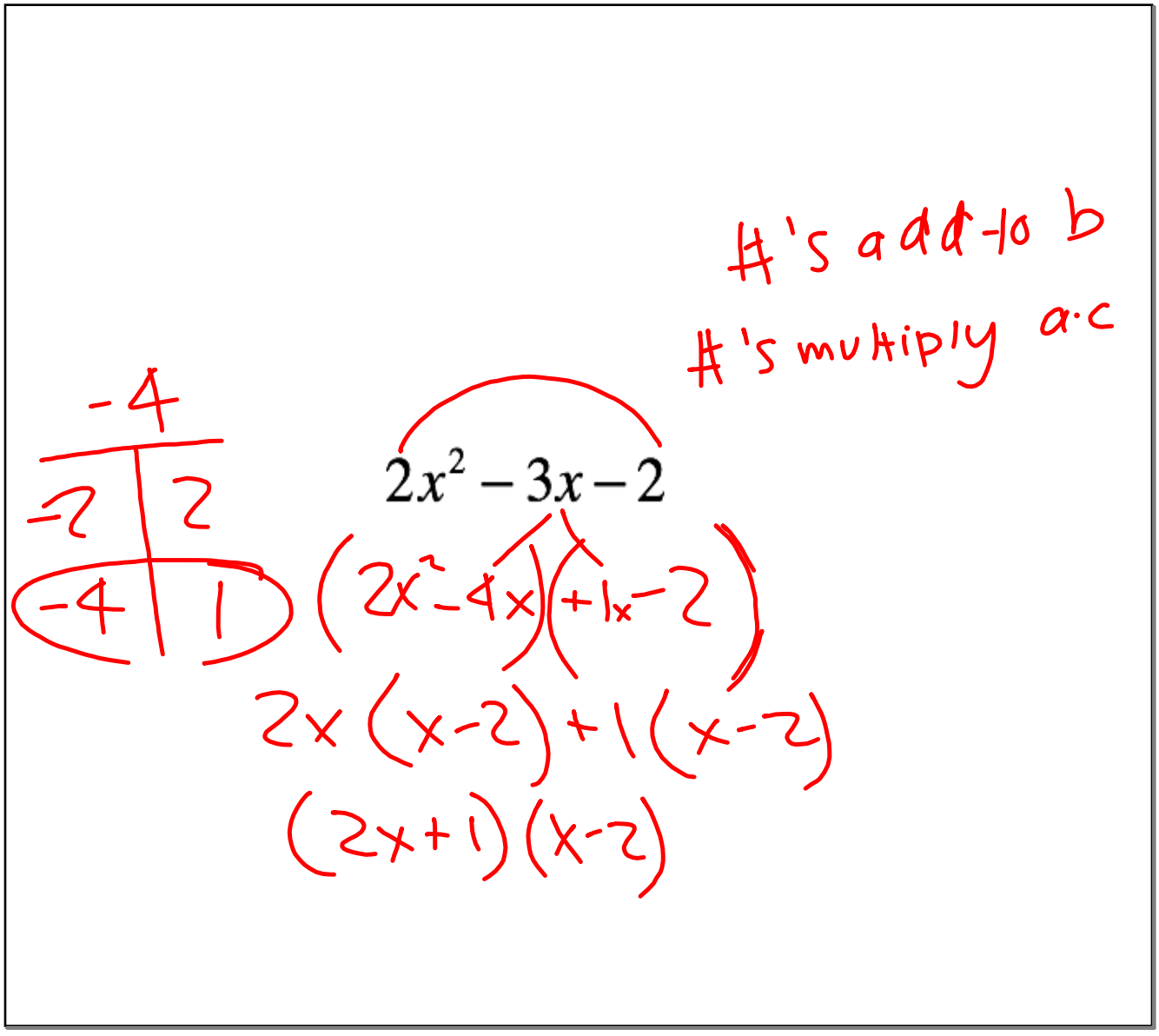
$(6x^2 - 10x)$ $(3x-5)$

$2x$ 1

$2x(3x-5) + (3x-5)$

$(3x-5)$

$(2x+1)$


#'s add to b
#'s multiply a·c
-4
-2 2
-4 1
$2x^2 - 3x - 2$
$(2x^2 - 4x)(+1x - 2)$
$2x(x-2) + 1(x-2)$
$(2x+1)(x-2)$

Greatest Common Factors pg. 355-356

(A) $6x^3 + 15x^2 + 6x$

$6x^3 + 15x^2 + 6x$

$3x(2x^2 + 5x + 2)$

(B) $2x^3 - 20x$

$2x^3 - 20x$

$2x(x^2 - 10)$

GCF: Biggest THING that evenly divides all TERMS

Factor.

$3x^3 + 7x^2 + 4x$

$x(3x^2 + 7x + 4)$

$4a^4b + 8a^3b^3 - 10a^2b^4$

$2a^2b(2a^2 + 4ab^2 - 5b^3)$

Special Factoring Patterns pg. 355

Remember the factoring patterns you already know:

Difference of two squares: $a^2 - b^2 = (a-b)(a+b)$

Perfect square trinomials: $a^2 + 2ab + b^2 = (a+b)^2$

$a^2 - 2ab + b^2 = (a-b)^2$

There are two other factoring patterns that will prove useful:

Sum of two cubes: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

Difference of two cubes: $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

#'s with square roots or cube roots

• 2 terms

Factor.

$x^3 - 27$ $a = x$ $b = 3$

$(x-3)(x^2+3x+9)$

$27x^3 + 64$ $a = 3x$ $b = 4$

$(3x+4)(9x^2-12x+16)$

$8x^3 + 64$

a

$x^3 + 4$ $a = x$

NOT FACTORABLE

$4x^2 - 36$ $a = 2x$ $b = 6$

Factoring by Grouping pg. 357

(A) $x^3 + x^2 + x + 1$

Write out the polynomial.	$x^3 - x^2 + x - 1$
Group by common factor.	$(x^3 - x^2) + (x - 1)$
Factor.	$x^2(x - 1) + 1(x - 1)$
Regroup.	$(x^2 + 1)(x - 1)$

(B) $x^4 + x^3 + x + 1$

Factor by Grouping. – 4 terms

$(x^3+3x^2)(+3x+9)$ $(x^3-3x^2)(+x-3)$

$x^2(x+3)+3(x+3)$ $x^2(x-3)+1(x-3)$

$(x+3)(x^2+3)$ $(x^2+1)(x-3)$

$(x^3+8x^2)(+6x+48)$

$x^2(x+8)+6(x+8)$

$(x^2+6)(x+8)$